Verilink QUAD DATA User Manual

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FCC Requirements

This equipment has been tested and found to comply within the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide protection against harmful interference in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, can cause harmful interference to radio communications.

There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception—which can be determined by turning the equipment off and on—try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with Part 68 of the FCC Rules. On the rear, side or bottom of the unit is a label that contains the FCC registration number and other information. If requested, provide this information to the telephone company.

- All direct connections to the network lines must be made using standard plugs and jacks (compliant with Part 68). The following tables list the applicable registration jack universal order codes (USOCs), facility interface codes (FICs), and service order codes (SOCs). These are required to order service from the telco.

For T1 interfaces:

Port ID	REN / SOC	FIC	USOC
1.544 Mbit/s SF 1.544 Mbit/s SF, B8ZS 1.544 Mbit/s ANSI ESF 1.544 Mbit/s ANSI ESF, B8ZS	6.0N	04DU9 -BN 04DU9 -DN 04DU9 -1KN 04DU9 -1SN	RJ-48C jack

For DDS interfaces:

Port ID	REN / SOC	FIC	USOC
56 kbit/s 64 kbit/s	6.0N	04DU5 -56 04DU5 - 64	RJ-48S jack

- If the unit appears to be malfunctioning, inform the telco and disconnect it from the network lines until the source of trouble is determined to be your equipment or the telephone line . If your equipment needs repair, it should not be reconnected until it is repaired.
- The unit has been designed to prevent harm to the network. If the telephone company finds that the equipment is exceeding tolerable parameters, it can temporarily disconnect service. In this case, the telephone company will provide you advance notice if possible.

- If the telephone company alters its equipment in a manner that can affect the use of this device, it must give you warning so that you have the opportunity to maintain uninterrupted service. You will be advised of your right to file a complaint with the FCC.
- No customer is authorized to repair this equipment, regardless of warranty status. All repairs must be performed by Verilink or an authorized agent. It is the responsibility of users requiring service to report the need for service to Verilink or to one of our authorized agents.

Lithium Battery

The lithium battery referred to in the following notices is contained inside the clock chip.

English

DANGER!

The battery can explode if incorrectly replaced! Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

DANGER!

To avoid electrical shock in case of failure, the power supply must be installed by a professional installer. The terminal labeled with the ground symbol (⏚) on the power supply must be connected to a permanent earth ground.

CAUTION!

Interconnecting circuits must comply with the requirements of EN60950:1992/A4:1997 Section 6.2 for telecommunications network voltages (TNV) circuits.

Français

ATTENTION!

Une explosion peut se produire si la batterie est remplacée d' une façon incorrecte! Remplacez-la seulement avec le même modèle de batterie ou un modèle équivalent selon les recommendations de manufacture. Disposez de les batteries usées selon les instructions de manufacture.

ATTENTION!

Pour éviter choc électrique en cas de insuccès, la provision de pouvoir doit êtré installé par un installeur professionnel. Le terminal de la provision de pouvoir, marqué du symbol de terre, (⏚) doit connecté à un circuit de terre permanent.

PRUDENT!

Les circuits doivent êtré interconnectés de manière à ce que l' équipement continue a êtré en agrément avec "EN60950:1992/A4:1997, Section 6.2, pour les circuits de voltage de liaisons d' échanges (réseau) par les télécommunications (TNV)," après les connections de circuits.

Española

ATTENCION!

La bateria puede explotar si se reemplaza incorrectamente. Reemplace la bateria con el mismo tipo de bateria ó una equivalente recomendada por el manufacturero. Disponga de las baterias de acuerdo con las instrucciones del manufacturero.

ATTENCION!

Para evitar contacto con circuitos que electrocutan, la fuente de alimentación debe ser instalada por un técnico profesional. La terminal de la fuente de alimentación marcada con el símbolo de tierra (⏚) debe ser conectada a un circuito de vuelta por tierra permanente.

PELIGRO!

Circuitos que se interconectan a la red de telecomunicaciones deben hacerse de tal manera que cumplan con los requisitos estipulados en las especificaciones "EN60950:1992/A4:1997, Sección 6.2, para los voltages de circuitos interconnectados a la Red de Telecomunicaciones (TNV)," despues de terminar las connecciones entre los circuitos.

Deutsch

VORSICHT!

Explosionsgefahr bei unsachgemäßem Ersetzen der Batterie! Batterie gleichen Typs und gleicher Qualität benutzen, wie vom Hersteller empfohlen. Entsorgung der Batterie nach Anweisung des Herstellers!

VORSICHT, GEFAHR!

Um keinen Schlag zu erhalten beim Versagen der electrischen Anlage, muss der Stromanschluss von einem Elektriker vorgenommen werden. Der elektrische Pol, versehen mit dem Erdsymbol (⏚) muss am Stromanschluss permanent geerdet sein.

VORSICHT!

Schaltungen, die in den Geräten zusammengeschaltet sind, müssen weiterhin den Vorschriften EN60950:1992/A4:1997, Absatz 6.2 für Telecommunications Netz Spannung (TNV) Schaltkreize entsprechen.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

The Industry Canada label indentifies CS-03 certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Safety Precautions

This equipment is intended to be installed only in a Restricted Access Location that meets the following criteria:

- Access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that must be taken.
- Access can only be gained through the use of a lock and key or other means of security, and is controlled by the authority responsible for the location.

When handling this equipment, follow these basic safety precautions to reduce the risk of electric shock and injury:

- Follow all warnings and instructions marked on the product and in the manual.
- Unplug the hardware from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a cloth slightly dampened with water.
- Do not place this product on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
- Slots and openings in the shelves are provided for ventilation to protect them from overheating. These openings must not be blocked or covered. Never place this product near a radiator or heat register.

- This product should be operated only from the type of power source indicated on the marking label and manual. If you are unsure of the type of power supply you are using, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will interfere with the free movement of people.
- Do not overload wall outlets and extension cords, as this can result in fire or electric shock.
- Never push objects of any kind into the shelves. They may touch dangerous voltage points or short out parts that could result in fire or electric shock. Never spill liquid of any kind on this equipment.
- Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power supply cord or plug is damaged or frayed.
    - If liquid has been spilled into the product.
    - If the product has been exposed to rain or water.
    - If the product has been dropped or if the cabinet has been damaged.

Product Warranty

Verilink's product warranty covers repair or replacement of all equipment under normal use for a five-year period from date of shipment. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer. Our in-house Repair Center services returns within ten working days.

Customer Service

Verilink offers the following services:

- System Engineers at regional sales offices for network design and planning assistance (800) 837-4546
- Technical Assistance Center for free 24x7 telephone support during installation, maintenance, and troubleshooting (800) 285-2755 and support@verilink.com
- To return a product, it must be assigned a Return Materials Authorization (RMA) number before sending it to Verilink for repair (800) 926-0085, ext. 2282
- Maintenance contracts and leasing plans (800) 837-4546
- Technical Training on network concepts and Verilink products (800) 282-2755 and training@verilink.com
- Web site (www.verilink.com)

Publications Staff

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Chapter 1 Overview

Scope

This manual describes the QUAD DATA module, a component of Verilink's Access System 3000 (AS3000) product line.

- This chapter presents an overview with illustrations of front and rear modules.
- Chapter 2, "*Quick Set-Up*" presents a sample configuration procedure, as a guide to configuring the QUAD DATA module.
- Chapter 3, "*Configuration*" presents a detailed listing of all configuration options.
- Chapter 4, "*Diagnostics*" details the Diagnostics Menu functions.

Purpose and Use

The QUAD DATA module is used to connect Data Terminal Equipment (DTE) or Data Communications Equipment (DCE) to a wide area network. All, or a portion of, the bandwidth of a network port on another AS3000 module can be mapped to any of the data ports on the QUAD DATA module. The Circuit Manager function of the SCM 3000 is required to map bandwidth from the QUAD DATA module, across the midplane of the shelf, to some other module.

Product Description

The QUAD DATA module supports four high-speed synchronous serial interfaces. Using the SCM node controller module, connections are mapped from the ports of the QUAD DATA module, across the shelf midplane, to other modules with network interfaces, such as an M1-3 T3 multiplexer, or a QUAD T1 four-port T1 CSU.

Four Interface Types

Each port of the QUAD DATA module can be configured to support any of four synchronous serial interface protocols: V.35, X.21, RS-449, or EIA 530. Each port can use a different interface protocol.

Map to Multiple Modules

Each port can be mapped to a different destination module, supporting different types of network interfaces (T1/T3). The data rate for each port can be as high as 1.536 Mbit/s. The total bandwidth for the module can be as high as 6.144 Mbit/s.

Compatible Modules

The AS3000 modules to which circuits can be built from a QUAD DATA module are:

- An M1-3—T3 multiplexer module.
- A QUAD T1—four port T1 CSU module.

Management Options

The QUAD DATA module is a single component of an AS3000 node. Each AS3000 node must contain an SCM module as the node controller. Management of the QUAD DATA module is done through the SCM.

The SCM provides the management interface to one or more of the following:

- A PC running the Verilink Node Manager application.
- Any computer running an SNMP management program.
- A terminal accessing the Craft (ASCII terminal) interface.

Related Verilink Documents

For basic information on Verilink AS3000 shelves, power supplies, and physical installation, see the manual *AS3000: The Basics.*

For information on the SCM 3000 SNMP node controller module and the Circuit Manager functions, see the *SCM User Manual*.

For information on the M1-3 multiplexer module, see the *M1-3 User Manual*.

For information on the QUAD T1 module, see the *QUAD T1 User Manual*.

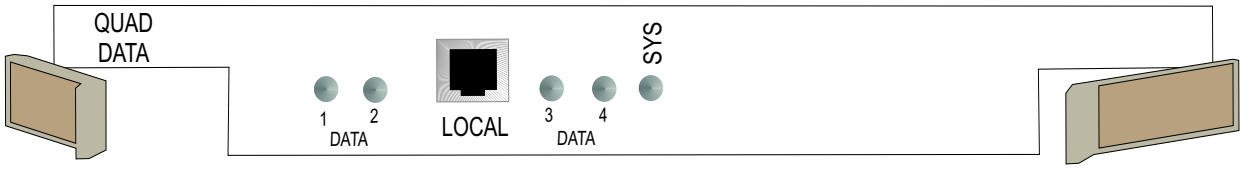
Components

A complete QUAD DATA installation consists of the QUAD DATA front module and a DIM 3030 rear connector module.

Front Module

The front panel of the QUAD DATA module has an RJ-11 modular Craft interface (ASCII terminal) port and 5 tri-color Light Emitting Diodes (LEDs) which give status indications.

Figure 1-1 QUAD DATA Front Panel



SYS LED

The SYS LED indicates the status of the QUAD DATA module. When the module is receiving normal power from the shelf power supplies, the SYS LED should be lit steady green.

During the process of power-up the SYS LED will be briefly amber as it negotiates with other modules for shelf controller status.

If the SYS LED is not lit, the QUAD DATA module has no power or it is defective.

Data Port LEDs

Each data port of the QUAD DATA module has an LED on the front panel as a status indicator.

Power-Up Sequence

During module initialization the front panel LEDs change state rapidly. First they will be all red, then all off except port 4 red, then a rapid countdown of red flashes from port 4 to port 1, then port 2 flashes orange three times. After a pattern of flashing green LEDs, they all flash green, then red, then go out for two seconds.

Once the module has completed the initialization self-test, the SYS LED will remain amber momentarily as the module negotiates shelf controller status.

Normal Operation

The meaning of the various states is listed in Table 1-1.

Table 1-1 LED States

State	Meaning
Not Lit	The port is not in service. Use the **QUAD DATA Configuration Menu** (Figure 3-2) to place the port in service. If no LEDs are lit, the module has no power.
Solid Green	Normal operation. There are no alarms, no loopbacks, and the port is in service.
Solid Red	Loss of Signal detection is enabled and the port detects that DTR is not asserted.
Solid Amber	A Data Port Loopback is active on the port.
Blinking Amber to Red	The QUAD DATA module is sending a test pattern and receiving errors.

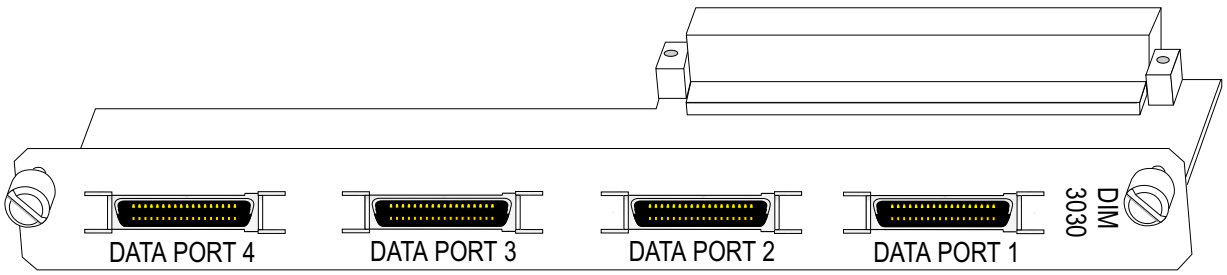
Local Port

The LOCAL port on the front of the QUAD DATA module is normally not used. Configuration and maintenance of the QUAD DATA module should be done by connecting to the LOCAL port of the associated SCM 3000 controller module.

Rear Module

The rear connector module used with the QUAD DATA front module is a DIM 3030 (DIM stands for Data Interface Module). See Figure 1-2.

Figure 1-2 DIM 3030 Rear Connector Module



Adapter Cables

The DIM 3030 rear connector module presents 4 mini D-Sub 26-pin connectors for the data ports. Depending on which electrical interface type and data port mode is selected in the **QUAD DATA Configuration Menu**, an appropriate adapter cable must be used. The adapter cables all have a mini D-Sub 26-pin connector at one end and the typical connector for the selected electrical interface at the other end.

If the data port mode is DCE, use one of the adapter cables in Table 1-2.

Table 1-2 DCE Mode Adapter Cables

Cable P/N	Electrical Interface	Connector Presented
458-501594-001	ITU V.35	Winchester 34-pin female
458-502059-001	RS-449 (RS-422)	DB-37 female
458-502045-001	EIA 530	DB-25 female
458-502047-001	X.21	DB-15 female

If the data port mode is DTE, use one of the adapter cables listed in Table 1-3.

Table 1-3 DTE Mode Adapter Cables

Cable P/N	Electrical Interface	Connector Presented
458-501594-101	ITU V.35	Winchester 34-pin male
458-502059-101	RS-449 (RS-422)	DB-37 male
458-502045-101	EIA 530	DB-25 male
Not Supported	X.21	N/A

NOTE: *The X.21 electrical interface does not support configurations of a DCE device to resemble DTE.*

Chapter 2 Quick Set-Up

This chapter details an example configuration and the necessary steps to configure it. It is almost certain that the configuration detailed here will not match yours exactly. Use this chapter as a guide to the process of configuring your QUAD DATA module.

Configuration of the QUAD DATA module is covered in detail in Chapter 3, "*Configuration*" in this manual. Diagnostics are covered in Chapter 4, "*Diagnostics*".

Example Configuration

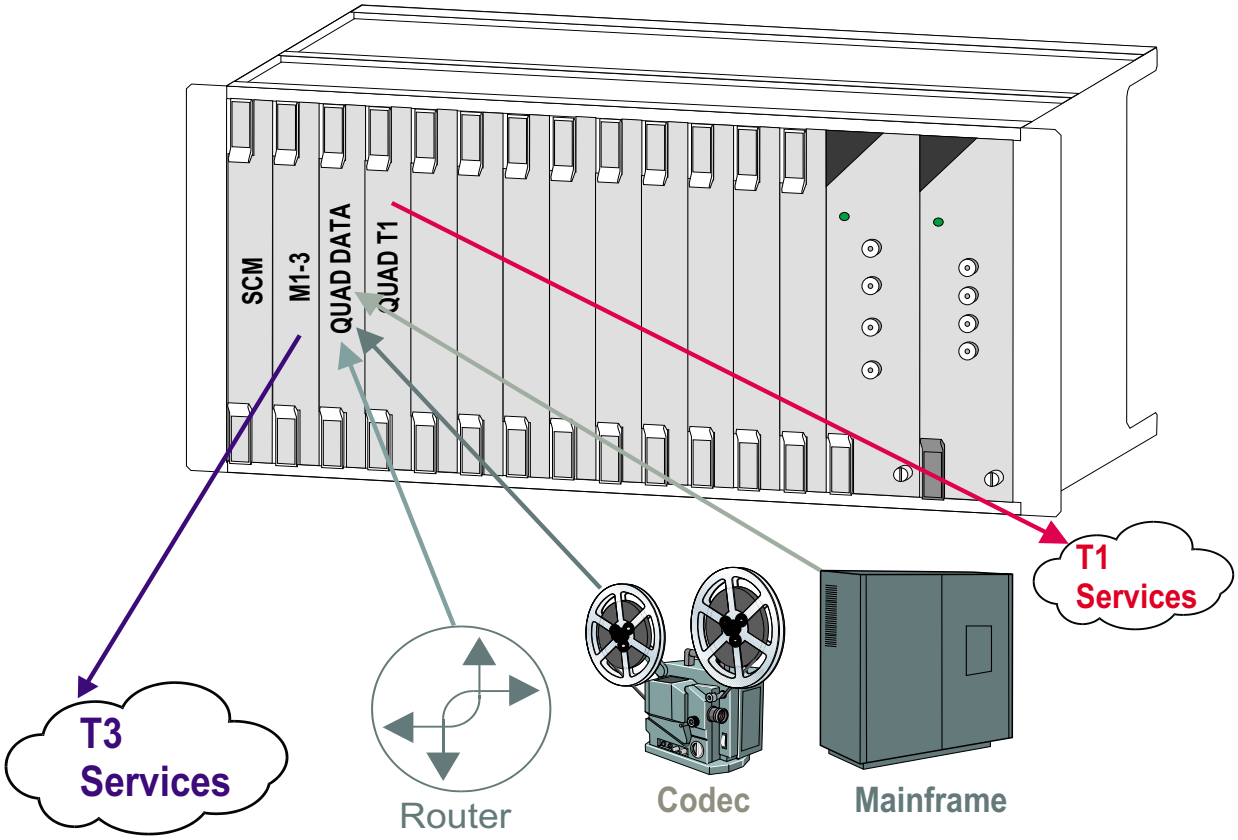
For this example configuration the following assumptions are made:

- That you are installing the QUAD DATA module in slot 3 of an MLS shelf set for shelf address 1.
- That an SCM is in slot 1, an M1-3 multiplexer is in slot 2, and a QUAD T1 module is in slot 4 of the shelf.
- That the four data ports of the QUAD DATA module are to be used as follows:
  - Port 1—V.35 @ 1.536 Mbit/s mapped to T1 number 4 of the M1-3 multiplexer for Cisco™ router traffic.
  - Port 2—EIA 530 @ 768 kbit/s mapped to the first 12 DS0s of T1 number 5 on the M1-3 multiplexer for a video codec.
  - Port 3—RS-449 @ 1.536 Mbit/s mapped to network port number 1 on the QUAD T1 module for an IBM mainframe channel extension.
  - Port 4—Not used for this example.

NOTE: *Always install rear connector modules first. Always remove front modules first.*

Figure 2-1 illustrates the shelf configuration for this example.

Figure 2-1 Example Configuration



Log In

Connect a Craft cable to the port labelled LOCAL on the front of the SCM module.

Connect the other end of the Craft cable to your PC or terminal. If using a PC, start a session in a terminal program.

1. Set your terminal parameters to:
   - 19.2 kbit/s
   - 8 data bits
   - No parity
   - One stop bit
   - No flow control
2. Press ENTER.
3. The prompt **pSH+>** appears.
4. Type “craft” (use lowercase)
5. The prompt **Your Password** appears.

6. Initially there is no password, press ENTER.
7. The **SCM Main Menu** appears.
8. Navigate to slot 3, the QUAD DATA module. Type "S" and press ENTER. At the prompt type "1,3" and press ENTER.
9. Type "C" and press ENTER to access the **QUAD DATA Configuration Menu**.

NOTE: *For the rest of this chapter, you will not be instructed to press* ENTER *after each command. Generally,* ENTER *is used after each keyboard entry.*

Figure 2-2 shows the default values for the **QUAD DATA Configuration Menu**.

Figure 2-2 QUAD DATA Configuration Menu

```
-- QUAD DATA CONFIGURATION MENU --

                              Port 1     Port 2     Port 3     Port 4

In)  in service               no         no         no         no
Fn)  interface type           V.35       V.35       V.35       V.35
Mn)  data port mode           DCE        DCE        DCE        DCE
Cn)  clock option             ST         ST         ST         ST
On)  enable LOS detect        no         no         no         no
An)  allow loopback           no         no         no         no
Ln)  X.21 C/I setting         ---        ---        ---        ---
SRn) DTR/DSR setting          DSR/normal DSR/normal DSR/normal DSR/normal
SSn) RTS/CTS setting          CTS/normal CTS/normal CTS/normal CTS/normal
SDn) DCD/LL setting           DCD/normal DCD/normal DCD/normal DCD/normal
SMn) TM/RL setting            TM /off    TM /off    TM /off    TM /off

C) copy port                 T) timing

X) exit this menu

A [0.0.0.60] [1,3] QUAD DATA >
```

Once each port has been configured, the Circuit Manager feature of the SCM is used to build the connections to other modules.

Module Configuration

The **QUAD DATA Configuration Menu** is used to enable each of the ports and configure parameters such as interface type and data port mode.

1. Type "I1", the prompt **Port 1 in service? (y/n):** appears. Type "y" for yes.

2. Use the **I2** and **I3** commands to place ports 2 and 3 in service.

3. Port 1 is set to V.35 by default. Use the **F2** command to select EIA 530 for port 2, then use the **F3** command to select RS-449 for port 3. Since the QUAD DATA module is Data Communications Equipment (DCE), and Data Terminal Equipment (DTE) is being connected, the default setting of DCE for data port mode is correct.

4. Port 1 of the QUAD DATA module is to carry Cisco™ router traffic. Since these routers wrap the DSU transmit clock signal back to the QUAD DATA Module on the optional third clock pair (TT in RS-449, SCTE in V.35), the port 1 clock option will be set to TT. Type "C1" and select "3" for TT. Leave ports 2 and 3 at the default value of ST.

5. There is no benefit gained by dis-allowing loopback testing. Set the **Allow Loopback** option to Yes for ports 1 through 3 by using the **A1**, **A2**, and **A3** commands.

6. The transmit timing options for the QUAD DATA module are accessed through a submenu. Type "T" to access the timing options submenu.

Figure 2-3 Timing Options

```
-- QUAD DATA CONFIGURATION MENU (TIMING OPTIONS)--

Current shelf timing source: card 4, net 1 (primary)

Source       Slot Number   Synchronization   Auto Restore

Primary       PC) 4        PS) net 1       PA) yes

Secondary     SC) 4        SS) net 2       SA) yes

Tertiary      TC) 4        TS) net 3       TA) yes

X) exit this menu

A [0.0.0.60] [1,3] QUAD DATA >
```

Timing Options

The **Timing Options Menu** is maintained by the SCM and applies to every T1 and QUAD DATA module in the shelf. When the QUAD T1 module was installed in slot 4 of this shelf, this menu was configured so that the first three network ports of the QUAD T1 module provide the three levels of timing source.

Under normal circumstances the T1 facility connected to network port 1 of the QUAD T1 module is the transmit timing source for the shelf. If that T1 fails, the second network port becomes the timing source. Should both fail, network port 3 becomes the timing

source. This set of options is correct when all of the T1 facilities connect to the same network service provider (NSP) and the T1 facilities pass through a Digital Access and Cross-connect System (DACS).

For this example, no changes to the timing options are required.

Use the **X** command to return to the **QUAD DATA Configuration Menu**, then use **X** again to return to the **SCM Main Menu** for the QUAD DATA module.

Building Circuits

The circuit manager function of the SCM is used to build circuits between ports on the AS3000 shelf. The SCM maintains a database of all circuits in the node. Access the circuit manager by typing “B”.

The **Circuit Manager Menu** appears, as shown in Figure 2-4.

Figure 2-4 Circuit Manager Menu

```
Circuit Manager -- [1,1] SCM  Firmware 1.12 --

      >>>>>> NO CIRCUIT FOUND IN DATABASE <<<<<



 A) add circuit                L) search circuit
 D) delete circuit             E) edit circuit

 P) prev page                  I) activate circuit
 N) next page                  R) deactivate circuit

 X) exit this menu

A [0.0.0.60] [1,3] QUAD DATA >
```

When there are no circuits configured yet, the message **>>>>>> NO CIRCUIT FOUND IN DATABASE <<<<<** appears.

If there are already circuits in the SCM database, a list of circuits is displayed.

This menu is used to create, activate, de-activate, edit, or delete all of the circuits between modules in an AS3000 shelf.

NOTE: *The assumption is made that all of the destination ports have been placed in service. If necessary, see the User Manuals for the associated modules. Always place ports in service before building circuits to them.*

Adding a Circuit

Type “A” to access the **Add Circuit Menu**. See Figure 2-5.

Figure 2-5 Add Circuit Menu

```
-- ADD CIRCUIT MENU [1,1] SCM  Firmware 1.12 --

 N) name: --                          M) mode: --

SP) src port: [-,-] undefined      DP) dst port: [-,-] undefined
    --port rate selection--             --port rate selection--
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )
    ( undefined port )                  ( undefined port )

    bus: AUT    ->-->>->> Circuit Inactive <<-<<--<-

 S) setup                             X) exit

A [0.0.0.2] [1,1] SCM >
```

1. Use the **N** command to give the circuit a name. For the first circuit use “QUADDATA_P1”.

2. Use the **M** command to set the mode to 64K, this means that for each DS0 timeslot used, we will use the full 64K of bandwidth.

NOTE: *When mapping a data port to a T1 network port connected to an AMI T1 facility, use 56K for the mode option.*

---

3. Use the **SP** command to set the source port to shelf 1, slot 3, data port 1. When configuring a circuit to a QUAD DATA module, DS0 timeslots are not specified. The data rate is set when the network port is configured.

4. Use the **DP** command to set the destination port to shelf 1, slot 2—the M1-3 multiplexer module. New fields appear on the menu, **DM** for destination port DS0 mapping and **DT** for destination port T1 mapping.

5. Use the **DM** command to select all 24 DS0s and use the **DT** command to select T1 number 4 of the 28 available virtual T1 circuits.

6. When the Setup command is used, the SCM will select the midplane bus for this circuit.

7. Type “S” to setup the circuit. A message should appear **Successful Circuit Build**.

This completes the configuration of the first example circuit. For the next circuit, begin by cloning from the existing circuit.

Type "X" to exit the **Add Circuit Menu** and return to the **Circuit Manager Menu**. The circuit which was just created is now listed at the top. See Figure 2-6.

Figure 2-6 Circuit Manager Menu with Circuit

```
Circuit Manager -- [1,1] SCM  Firmware 1.12 --

  Page : 1
  Total: 1 circuits

 Name         Type Mode  Prio     Src Port          Dest Port      Bus  Status
------------ ---- ----  ----  ---------------  ---------------  ---  ------
QUADDATA_P1  perm 64k   norm  [1, 3] QUAD dat1  [1, 2] HSM  M13   AUT  Active

 A) add circuit                 L) search circuit
 D) delete circuit              E) edit circuit

 P) prev page                   I) activate circuit
 N) next page                   R) deactivate circuit

 X) exit this menu

A [0.0.0.60] [1,3] QUAD DATA >
```

Cloning a Circuit

With at least one circuit in the SCM database, additional circuits can be created by cloning an existing circuit. This method saves time.

NOTE: *When the name of an active circuit is changed in the Edit Circuit Menu, a new circuit is created which initially has the same values. If changes are made to eliminate conflicts between circuits, the new circuit can be successfully setup and saved. We refer to this process as "cloning".*

The example configuration describes a circuit from port 2 of the QUAD DATA module to the first 12 DS0s of T1 number 5 on the M1-3 multiplexer. While the first circuit is active, use these steps to clone it to the second circuit.

1. Type "E" to begin. Input "QUADDATA_P1" at the circuit name prompt. The **Edit Circuit Menu** appears.

2. Type "N" to change the name. Enter "QUADDATA_P2". The menu is redrawn with all of the source and destination port values of the original circuit, but the status is shown as inactive.

3. Type "SP" to change the Source Port. Set it to shelf 1, slot 3, data port 2. (Port 2 of the QUAD DATA module).

4. The destination of circuit 2 is still the M1-3 multiplexer. The value for **DP** is already correct. Use the **DT** command to select virtual T1 number 5 of the 28 T1 circuits available in the M1-3 mux.

5. Type “DM” to change the destination port DS0 mapping. Set it to shelf 1, slot 2, DSOs 1 through 12.

6. The settings for circuit type, priority, mode, and bus are already correct. Type “S” to setup the circuit. A message should appear **Successful Circuit Build**. Exit to the Circuit Manager Menu with the **X** command.

Cloning Circuit 3

1. Type “E” to begin. Input “QUADDATA_P1” at the circuit name prompt. The **Edit Circuit Menu** appears.

2. Type “N” to change the name. Enter “QUADDATA_P3”. The menu is redrawn with all of the source and destination port values of the original circuit, but the status is shown as inactive.

3. Type “SP” to change the Source Port. Set it to shelf 1, slot 3, data port 3. (Port 3 of the QUAD DATA module).

4. The destination of circuit 1 is the M1-3 multiplexer, whereas circuit 3 of this example uses a QUAD T1 module in slot 4 for the destination. Use the **DP** command to select shelf 1, slot 4, network port 1. The **DT** command disappears because the new destination module does not map multiple T1 circuits to a single network port.

5. Type “DM” to change the destination port DS0 mapping. Set it DSOs 1 through 24.

6. The settings for mode, and bus are already correct. Type “S” to setup the circuit. A message should appear **Successful Circuit Build**.

Exit to the Circuit Manager Menu with the **X** command. Use **X** again to return to the **Main Menu**.

Connect DTE

The DIM 3030 rear connector module is used with the QUAD DATA front module. It has four mini D-sub 26-pin connectors.

Connect a (P/N 458-501594-001) V.35 adapter cable to data port 1 on the DIM 3030, connect the router to the Winchester 34-pin connector.

Connect an (P/N 458-502045-001) EIA 530 adapter cable to port 2 for the video codec.

Use a (P/N 458-502059-001) RS-449 adapter cable on port 3 for the mainframe channel extension.

Diagnostics has information on testing circuits.

Chapter 3 Configuration

This chapter covers configuring the QUAD DATA module through the Craft interface. The assumption is made that you are using an ASCII terminal connected to the LOCAL port of an SCM controller module.

Craft Interface

Verilink refers to the ASCII terminal interface of the AS3000 products as a Craft interface. Application modules can be configured, circuits built, diagnostics performed and performance monitored using the Craft interface.

Terminal Setup

Set your terminal parameters to:

Data rate: 19.2 kbit/s

Word size: 8 bits

Parity: None

Stop bits: One

Flow control: None

The Verilink Craft interface does not assert any control leads.

Verilink provides two types of Craft cable. Both versions of the Craft cable have an RJ-11 modular connector at one end. The original cable has a female DB-25 connector at the other end and a more recent version has a DB-9 female connector. Connect the RJ-11 modular connector to the port labeled LOCAL on the front of the SCM module.

The original Craft cable pinout is shown in Table 3-1.

Table 3-1 Verilink Craft Cable P/N 458-501788-008

DB-25 female	RJ-11 modular	Usage
pin 2	pin 3	Transmit Data
pin 3	pin 4	Receive Data
pin 7	pin 5	Signal Ground

Your computer may have a DB-9 connector for the COM port, requiring a second cable or adapter to complete the connection. For this purpose, use the same type of standard PC AT serial cable as would be used to connect to an external modem.

The current Craft cable uses DB-9 and RJ-11 connectors, eliminating the need for a second cable when the COM port of a PC is used. It is wired according to the pinout shown in Table 3-2:

Table 3-2 DB-9 Craft Cable P/N 458-102119-008

DB-9 female	RJ-11 modular	Usage
pin 3	pin 3	Transmit Data
pin 2	pin 4	Receive Data
pin 5	pin 5	Signal Ground

Log In

The first thing displayed after connecting a terminal and pressing the ENTER key is:

pSH+>

Certain TCP/IP and UNIX commands are available from this prompt (ping, FTP, mv, rm, ls).

Most often you will want to use the Craft interface. To reach the Craft interface from the **pSH+>** prompt, type the word “craft” in lowercase:

pSH+> craft

The password prompt appears:

YOUR PASSWORD?

Initially there is no password, so just press ENTER again.

The **SCM Main Menu** is displayed, as shown in Figure 3-1.

Figure 3-1 SCM Main Menu

```
-- VERILINK SCM CONTROLLER : FW Rev 2.05, May  7 1999 14:32:21   --

   Site name:  Tech Pubs SCM                 Access level:  2
   Managing at NEAR end node [0.0.0.4]            Node id:  21

                          <- SLOT ->
 SHELF   1   2   3   4   5   6   7   8   9   10  11  12  13
   0 M [*S]  M   -   D   H   -   -   -   -   -   -   -   -
   1     -   -   -   -   -   -   -   -   -   -   -   -   -
   2     -   -   -   -   -   -   -   -   -   -   -   -   -
   3     -   -   -   -   -   -   -   -   -   -   -   -   -
   4     -   -   -   -   -   -   -   -   -   -   -   -   -
KEY: D=QUAD D, I=IMUX, M=M1-3, Q=QUAD T1, S=SCM

S) shelf/slot                 O) administration
C) configuration              D) diagnostics
P) performance/status         A) alarm
B) circuit manager            I) manufacturing info
X) exit this menu

A [0.0.0.4] [0,1] SCM >
```

Select QUAD DATA Module

When you first log in to an SCM controller, the SCM module is selected. Square brackets indicate the currently selected module **[*S]**. The prompt line also indicates which module is selected, **A [0.0.0.4] [0,1] SCM >**.

Use the **S) shelf/slot** command to navigate to another module.

Type "S" and press ENTER. At the prompt, type the number of the slot where the QUAD DATA module resides. (shelf 1, slot 4 in the node shown in Figure 3-1) and press ENTER.

Configuration Menu

Use the **C** command to access the **QUAD DATA Configuration Menu**, as shown in Figure 3-2.

Figure 3-2 QUAD DATA Configuration Menu

```
-- QUAD DATA CONFIGURATION MENU --

                              Port 1     Port 2     Port 3     Port 4

In)  in service               yes        yes        yes        yes
Fn)  interface type           EIA-530    RS-449     RS-449     V.35
Mn)  data port mode           DCE        DTE        DTE        DCE
Cn)  clock option             ST         ---        ---        Invert ST
On)  enable LOS detect        no         no         no         no
An)  remote  loopback         no         no         no         no
Ln)  X.21 C/I setting         ---        ---        ---        ---
SRn) DTR/DSR setting          DSR/normal DTR/normal DTR/normal DSR/normal
SSn) RTS/CTS setting          CTS/normal RTS/normal RTS/normal CTS/normal
SDn) DCD/LL setting           DCD/normal LL /off    LL /off    DCD/normal
SMn) TM/RL setting            TM /off    RL /off    RL /off    TM /off

C) copy port                 T) timing

X) exit this menu

A [0.0.0.2] [1,2] QUAD DATA >
```

Configuration Options

The options available on the **QUAD DATA Configuration Menu** are listed in Table 3-3.

Table 3-3 QUAD DATA Configuration Options

Menu Option	Description	Instructions
In) in service	Places ports in or out of service.	Place ports in service before building circuits to them. Type “I1” to place port 1 in service, “I2” for port 2, etc.
Fn) interface type	Selects the synchronous serial interface type for the port. The selections for interface type and data port mode determine the adapter (pigtail) cable required as described to the right.	Type “F1” through “F4” and choose from: 1)V.35—Use adapter cable 458-501594-001 in DCE mode or 458-501594-101 in DTE mode. 2)X.21—Use adapter cable 458-502047-001 in DCE mode DTE mode is not supported for X.21. 3)RS-449—Use adapter cable 458-502059-001 in DCE mode or 458-502059-101 in DTE mode. 4)EIA-530—Use adapter cable 458-502045-001 in DCE mode or 458-502045-101 in DTE mode.
Mn) data port mode	Selects the mode in which the port operates, DCE or DTE.	DCE mode is used most often. When connecting the QUAD DATA port to a DCE device, if DTE mode is used, that DCE must be configured as the transmit clock source for the entire shelf. Often it will not be desirable to have a data port clock the shelf. See “Mode” in this chapter.

Menu Option	Description	Instructions
Cn) clock option	Sets the source of the clock signal used to control the sampling of Transmit Data by the port and the phase relationship of that clock signal to Transmit Data. Use TT whenever the QUAD DATA port is connected through a crossover cable to another DCE device, such as a CSU/DSU (tail circuit timing). Type "C1" to select the clock option for port 1, "C2" for port 2, "C3" for port 3, or "C4" for port 4. Since X.21 uses a single clock pair (S) for all clock functions, this option is not selectable when the interface type is X.21.	ST—The port samples the transmit data lead during the negative going transition of the transmit clock signal provided by the module. This is the default setting which is most often the best selection. INV ST—The data port samples the transmit data lead during the positive going transition of the transmit clock signal provided by the module. This setting may be helpful if sampling errors occur because of a long cable between the DTE and the QUAD DATA module, and/or when the data rate is very high. TT—The data port samples the transmit data lead during the negative going transition of an external clock signal provided by the DTE. This external clock is usually the transmit clock signal which the QUAD DATA module provides, simply fed down the cable to the DTE, which wraps it back to the port. This is done to control the phase relationship between the transmit data and the sampling of the data port. Most types of DTE do not wrap clock back to the DCE, therefore with most DTE this feature will not operate. When it is known that the DTE does wrap clock back to the DCE, it is advantageous to use this feature, as sampling errors caused by cable-induced phase angles are prevented.
On) enable LOS detect	Enables or disables the monitoring of the Data Terminal Ready lead (DTR) on a per port basis.	If enabled, the QUAD DATA module will declare a Loss Of Signal (LOS) alarm whenever the DTR lead is not asserted by the DTE. This feature allows the detection of a DTE failure or disconnected DTE cable.
An) remote loopback	Enables or disables loopbacks per port.	If loopbacks are disabled, operator requests for remote loopbacks and received loop codes are ignored. Enable loopbacks is most often the best selection.
Ln) X.21 C/I setting	When the interface type is X.21, allows the Indication lead to be forced on.	If the port is in DCE mode, allows the Indication lead (I) to be forced on. (Indication combines the functions of CTS and DCD). DTE mode is not supported, the lead called Control (C) can not be forced on.
SRn) DTR/DSR setting	Allows the Data Terminal Ready (DTR) or Data Set Ready (DSR) lead to be forced on. When not forced, DSR is on if DTR is presented by the DTE and no red alarm condition exists.	In DCE mode, this option allows DSR to be forced on—the QUAD DATA module provides DSR and ignores the true state of DTR. In DTE mode, this option allows DTR to be forced on as an output to the connected device regardless of the actual state of DSR.
SSn) RTS/CTS setting	Allows the RTS or CTS lead to be forced on. When not forced, CTS is on if RTS is presented by the DTE and no red alarm condition exists.	In DCE mode, this option allows CTS to be forced on—the QUAD DATA module provides CTS and ignores the true state of RTS. In DTE mode, this option allows RTS to be forced on as an output to the connected device.
SDn) DCD/LL setting	Allows the Data Carrier Detect (DCD) or Local Loopback (LL) leads to be forced on.	In DCE mode, allows DCD to be forced on. Normally DCD is on only when a circuit is built from the QUAD DATA port to a network port on another module. In DTE mode, allows LL to be forced on. Force LL on only for testing.

Menu Option	Description	Instructions
SMn) TM/RL setting	Allows the Test Mode (TM) or Remote Loopback (RL) lead to be forced on.	In DCE mode, allows TM indication to the DTE to be forced on. Use this feature only for testing. In DTE mode, allows a request for a Remote Loopback to be forced on. Use this feature only for testing.
C) copy port	Used to copy all of the settings for one port to one, two or all three of the other ports.	First configure the port to be copied, then use this command. Indicate the port to be copied from first, then which ports to copy to.
T) timing	Selects the timing submenu.	See the section "Timing Menu".
X) exit this menu	Exits the **QUAD DATA Configuration Menu**.	Returns to the **SCM Main Menu**.

Mode

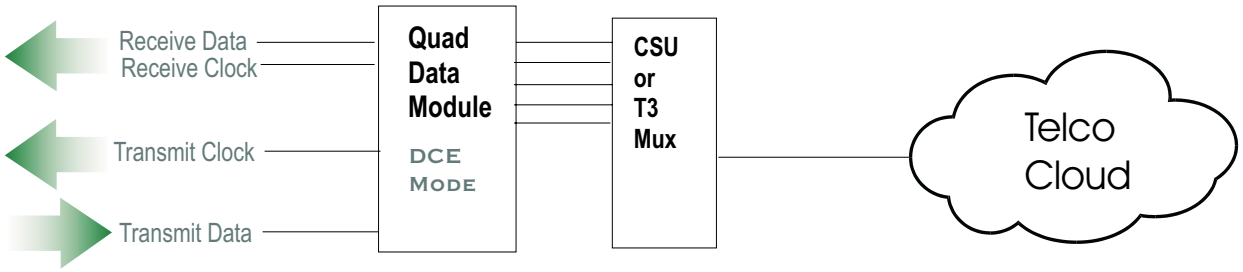
Because it is used to connect other devices to a WAN (Wide Area Network), the QUAD DATA module actually is Data Communications Equipment, regardless of the selection for the DCE/DTE mode option. Any device receiving synchronous serial data from a WAN must and will output that data at the rate at which it is received. The mode option can be used to make the QUAD DATA port behave as DTE, but careful consideration should be given to the implications for timing the shelf.

DCE Mode

When configured as DCE, a QUAD DATA port outputs the information arriving from the WAN on the Receive Data pair, in perfect synchronization with the Receive Clock which it also outputs.

DCE provides clock, DTE accepts clock. See Figure 3-3.

Figure 3-3 DCE Mode Signal Flow



In DCE mode, Receive Data and both clocks are outputs from the Quad Data module

DTE Mode

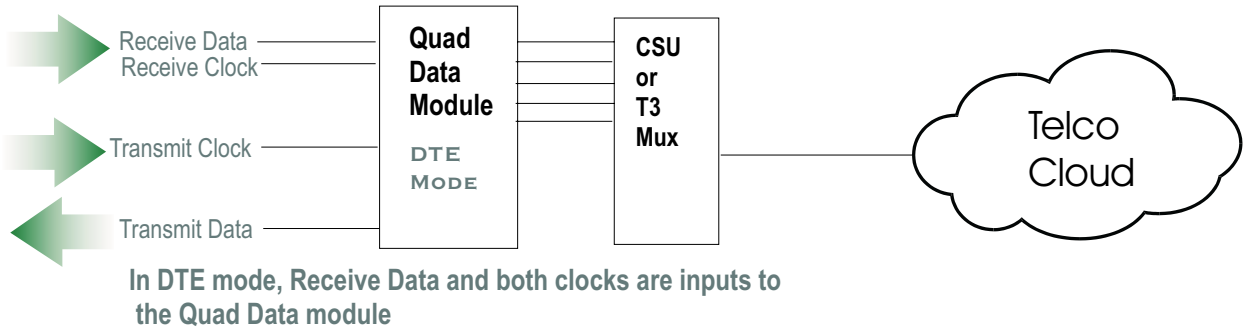
An actual Data Terminal Equipment (DTE) device is throttled by the DCE Transmit Clock and Receive Clock. When a QUAD DATA module is configured as DTE, it outputs the information arriving from another location on the Transmit Data pair (DTE accept data on the Receive Data pair and output data on the Transmit Data

pair). In a synchronous interface there must always be a clock related to each datastream. When in DTE mode, the QUAD DATA module outputs a clock which is derived from the data arriving from another location on the Terminal Timing pair (Serial Clock Transmit External in V.35). The device connected to the QUAD DATA module must use that clock (on TT or SCTE) to control its sampling of Transmit Data.

NOTE: *Because it has a simplified clock interface design (only one pair of clock leads) DTE mode is not supported for the X.21 interface type.*

When it is in DTE mode, the QUAD DATA module accepts information which is to be sent to the WAN on the pair designated Receive Data. The clock presented along with that data, on the Receive Clock pair, must be used to control the transmission rate of that data on to the WAN. If the clock on the Receive Pair does not drive the transmit path, buffer over-runs and/or buffer under-runs will occur leading to a loss of data. See Figure 3-4.

Figure 3-4 DTE Mode Signal Flow



Since the AS3000 shelf has a single timing source for all T1 network ports, and since the device connected to a port set for DTE must provide transmit clock, logic dictates that any QUAD DATA port configured for DTE mode must provide the transmit clock for every T1 network port in that shelf. This is likely to produce undesirable complications in the network design.

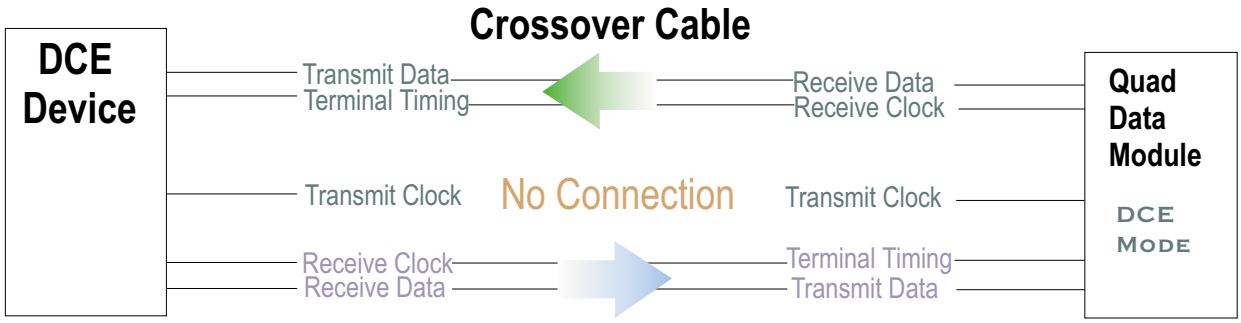
Tail Circuit Timing

When connecting a QUAD DATA port to a DCE device, a crossover cable can be used instead of putting the port in DTE mode. This method allows the QUAD DATA port to be kept in DCE mode. In this scenario, instead of the QUAD DATA port accepting a clock from the external DCE device, the QUAD DATA port provides the clock. The external DCE device must then use the clock provided by the QUAD DATA module as its transmit timing source.

Summary

If the network design requires a QUAD DATA port to provide clock to a tail circuit—use a crossover cable to connect the external DCE and put the QUAD DATA port in DCE mode. See Figure 3-5.

Figure 3-5 Crossover Cable



If the network design requires the QUAD DATA port to be part of a tail circuit, accepting timing from a DCE device—there are two methods available:

- Use a straight through cable to connect the DCE to the QUAD DATA port, put the port in DTE mode, and set the port to be the shelf timing source (see the section "Timing Menu").
- Use a crossover cable to connect the DCE to the QUAD DATA port, put the port in DCE mode, set the clock selection to TT, and set the port to be the shelf timing source (see the section "Timing Menu").

Timing Menu

The SCM maintains a timing table for all of the modules in each shelf of a node. This table determines the transmit clock source for each QUAD DATA module in the shelf, as well as all T1 network modules.

NOTE: *Any QUAD DATA port configured for DTE mode must provide clock for the shelf. Each shelf may have only one active clock source. Therefore all QUAD DATA ports set for DTE mode in any shelf must be connected to the same clock source.*

The **Timing Menu** is accessed by using the **T** command on the **QUAD DATA Configuration Menu**. See Figure 3-6.

Figure 3-6 Timing Menu

```
-- QUAD DATA CONFIGURATION MENU (TIMING OPTIONS)--

Current shelf timing source: card 3, net 1 (primary)

Source       Slot Number   Synchronization   Auto Restore

Primary       PC) 3        PS) net 1       PA) yes

Secondary     SC) 4        SS) data 1      SA) yes

Tertiary      TC) 5        TS) net 1       TA) yes

X) exit this menu

A [0.0.0.4] [0,4] QUAD DATA >
```

Set the options on the **Timing Menu** in the order in which they are documented in Table 3-4.

Table 3-4 Timing Menu Options

Menu Option	Description	Instructions
PC)	The slot number of the application module which will be the primary clock source for this shelf. This module will provide the clock signal used to drive the transmit clock circuitry for all modules in the shelf that use T1 rate clocks.	At the prompt, type the slot number of the module selected as the primary clock source.
PS)	Clock source within the module selected for the PC option.	Select from the list of ports available on the module.
PA)	Enables or disables fallback to primary clock source after a failed condition has cleared. If disabled, the SCM never reverts to the primary clock source until an operator changes this option.	Set to "Yes" if the node is to revert to a timimg source which failed, but is now OK.
SC)	The slot number of the application module which will be the secondary clock source for this shelf. If the primary clock source fails, this module will provide the clock signal used to drive the transmit clock circuitry for all of the cards in the shelf which use T1 rate clocks.	At the prompt, type the slot number of the module selected as the secondary clock source.
SS)	Clock source within the module selected for the SC option.	Select from the list of ports available on the module.
SA)	Enables or disables fallback to secondary clock source after a failed condition has cleared. If disabled, the SCM never reverts to the secondary clock source until an operator changes this option.	Set to "Yes" if the node is to revert to a timimg source which failed, but is now OK.
TC)	The slot number of the application module which will be the tertiary (third) clock source for this shelf. If both the primary and secondary clock sources fail, this module will provide the clock signal used to drive the transmit clock circuitry for all of the cards in the shelf which use T1 rate clocks.	At the prompt, type the slot number of the module selected as the secondary clock source.
TS)	Clock source within the module selected for the TC option.	Select from the list of ports available on the module.
TA)	Enables or disables fallback to tertiary clock source after a failed condition has cleared. If disabled, the SCM never reverts to the tertiary clock source until an operator changes this option.	Set to "Yes" if the node is to revert to a timimg source which failed, but is now OK.
X)	Returns to the **QUAD DATA Configuration Menu**.	Exits the **Timing Menu.**

Building Circuits

When all of the ports on the QUAD DATA module have been configured, use the Circuit Manager function of the SCM to build circuits from the QUAD DATA module to the desired network interface modules.

Since the Circuit Manager is a function of the SCM, it is covered in detail in the *SCM User Manual*.

A brief discussion of building circuits can be found in the section "Building Circuits" in Chapter 2 of this manual.

Chapter 4 Diagnostics

This chapter covers the use of the **Diagnostics Menu** and the **Alarm Menu**. Diagnostics are used to test and verify the QUAD DATA module and associated network circuits. The **Alarm Menu** is used to enable and configure alarm reporting.

Diagnostics Menu

Diagnostics are used to initiate or terminate loopbacks and test patterns for testing and troubleshooting.

Accessing the Menu

To access the **Diagnostics Menu** for the QUAD DATA module, first select the module, (see Craft Interface in Chapter 3).

Once the QUAD DATA module has been selected, use the **D** command to access the **Diagnostics Menu**. See Figure 4-1.

Figure 4-1 QUAD DATA Diagnostics Menu

```
-- QUAD DATA DIAGNOSTICS MENU --

                              Port 1     Port 2     Port 3     Port 4

Interface type                V.35       EIA-530    RS-449     X.21
DPL loopback                  yes        no         no         no
Far-end loopback              no         no         no         no
Test pattern                  none       none       none       none
Pattern sync                  ---        ---        ---        ---
Test error counter            30402      0          0          0
LOS detected                  no         yes        no         no
DTR (C)                       off <-     off <-     on ->      off <-
DSR (I)                       off ->     on ->      off <-     off ->
RTS                           off <-     off <-     off ->     ---
CTS                           off ->     on ->      off <-     ---
DCD                           on ->      on ->      off <-     ---
LL                            off <-     off <-     off ->     ---
RL                            off <-     off <-     off ->     ---
TM                            on ->      on ->      off <-     ---

Dn) data port loop       Tn) test pattern           In) insert bit error
Fn) send FT1 code        En) reset test counter     X) exit this menu

A [0.0.0.4] [0,4] QUAD DATA >
```

Diagnostics Information

The first fifteen lines on the **QUAD DATA Diagnostics Menu** present information about the status of each port. Arrows pointing left or right appear next to the values for the control leads. These indicate the origin of the referenced signals. A left arrow indicates an input to the QUAD DATA module, a right arrow represents an output from the QUAD DATA module.

Table 4-1 details the information fields on the **QUAD DATA Diagnostics Menu**.

Table 4-1 Diagnostics Menu Information Fields

Display Field	Description	Instructions
Interface type	Indicates which synchronous serial interface type has been selected for the port. Available are V.35, X.21, RS-449, and EIA 530.	Use the **QUAD DATA Configuration Menu** (Figure 3-2) to change this selection.
DPL loopback	Indicates whether a Data Port Loopback is currently in effect on the port. The Data Port Loopback is a bi-directional loopback.	Use the **Dn)** command to establish and terminate loopbacks. See Table 4-2.
Far-end loopback	Indicates whether a far-end loopback, initiated by this module, has been detected.	See the section "Far-End Loopback" in this chapter.
Test pattern	Indicates what test pattern, or none, is running on the port.	Possible values are **none** or **QRSS** (Quasi-Random Signal Sequence).
Pattern sync	During a test, indicates whether the receive circuitry is in sync with the test pattern.	Used to verify the test pattern is being received from the far end.
Test error counter	Cumulative indicator of bit errors received during tests.	Use the **En**) command to reset the test error counter. See Table 4-2.
LOS detected	Loss Of Signal—Indicates whether the port has detected the DTR lead, an output from the DTE, is in a low (Off—negative voltage) state.	Use the **QUAD DATA Configuration Menu** (Figure 3-2) to enable or disable LOS detection.
DTR (C)	Indicates the state of Data Terminal Ready (or Control in the case of a port optioned for X.21 interface type).	DTR is an output from the DTE and an input to the QUAD DATA port (when the port is in DCE mode).
DSR (I)	Indicates the state of Data Set Ready (or Indication in the case of a port optioned for X.21 interface type).	DSR is an output from the QUAD DATA module in DCE mode. It is the logical complement of DTR.
RTS	Indicates the state of Request To Send (not applicable to X.21 ports).	RTS is an output from the DTE and an input to the QUAD DATA port (in DCE mode).
CTS	Indicates the state of Clear To Send (not applicable to X.21 ports).	CTS is an output from the QUAD DATA module in DCE mode. It is the logical complement of RTS.
DCD	Indicates the state of Data Carrier Detect (not applicable to X.21 ports). DCD will not be on until the data port is mapped to an active network port that is not in an alarm state.	DCD is an output from the QUAD DATA module in DCE mode. It indicates that the network port is not in a red alarm condition.

Display Field	Description	Instructions
LL	Indicates the status of the interface lead Local Loopback (not applicable to X.21 ports). This is an indicator in DCE mode, or an output which can be forced on in DTE mode.	The DTE can use LL to establish a Local Loopback in the DCE.
RL	Indicates the state of the interface lead Remote Loopback (not applicable to X.21 ports). This is an indicator in DCE mode, or an output which can be forced on in DTE mode.	The DTE can use RL to cause the local DCE to transmit a request for a Line Loopback to the network. The resulting Line Loopback can be terminated while RL is still ON.
TM	Indicates whether the port is in Test Mode.	On during a Data Port Loopback, off in the absence of a DPL. Applies to DCE mode only.

Diagnostics Commands

The lower portion of the **QUAD DATA Diagnostics Menu** presents command options used to control loopbacks and tests. These options are detailed in Table 4-2.

Table 4-2 QUAD DATA Diagnostics Commands

Menu Option	Description	Instructions
Dn) data port loop	Used to establish or terminate a bi-directional loopback on any of the QUAD DATA ports.	Typically a loopback is established first, then a test pattern is started. While the test pattern is being transmitted, the device sending the pattern monitors receive data, expecting to receive the same pattern.
Tn) test pattern	Selects a Quasi-Random Signal Sequence (QRSS) or no test pattern.	Select **QRSS** to start a test. Select **None** to end the test. Test patterns are sent toward the network only, not to the locally connected device. *When a test pattern is used in conjunction with a data port loop, always start the test pattern first.*
In) insert bit error	Used to send an intentional error in the test pattern. If the pattern being sent is also being received, an error will be counted.	This function is used to verify that the test pattern being received is actually the same pattern which is being transmitted. It verifies that a loop is present in the network or a far-end device.
Fn) send FT1 code	Sends an inband loop-up or loop-down code which should initiate or terminate, respectively, a data port loopback in the far end QUAD DATA module or DSU.	Select **activate** to send a loop-up code to the far-end device. Select **deactivate** to send a loop-down code for the purpose of terminating a far-end loopback. See the section "Far-End Loopback" in this chapter.
En) reset test counter	Sets the Test Error Counter for the port to zero.	Used to clear old test results before (or just after) beginning a new test.
X) exit this menu	Exits to the menu above.	Returns to the **QUAD DATA Main Menu**.

Testing

This section describes methods of testing the QUAD DATA module and network facilities using the functions of the **QUAD DATA Diagnostics Menu**.

Using Loopbacks

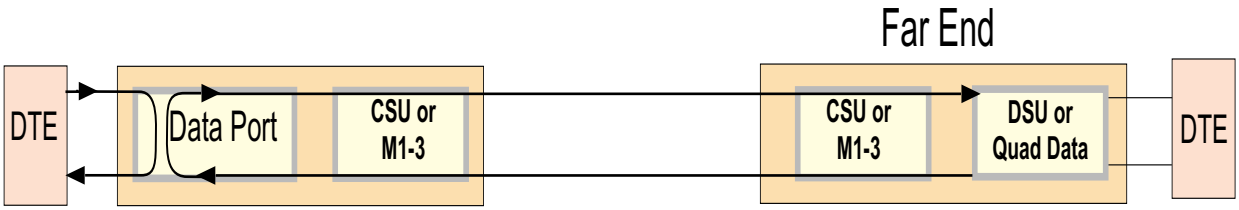
A typical way to use the **Diagnostics Menu** might involve the following steps:

1. Establish a loopback.
2. Start transmitting a test pattern.
3. Reset the test error counter.
4. Observe the test error counter to see if the test pattern is received as it was sent.
   a. If no errors are observed, move the point of loopback further away to test more of the circuit path, or
   b. If errors are observed, move the point of loopback closer to determine the source of the problem.
5. Stop the test pattern, drop all loopbacks, then:
   a. Place the circuit back into service if all tests passed, or
   b. Contact the appropriate vendor if a problem was found.

Data Port Loopback

The Data Port Loopback (DPL) test is a bi-directional loopback. Any Data Terminal Equipment (DTE) connected to the QUAD DATA port will receive whatever it is transmitting. If the local DTE indicates no errors, the cabling to the QUAD DATA module and the local DTE are proven good. See Figure 4-2.

Figure 4-2 Data Port Loopback.



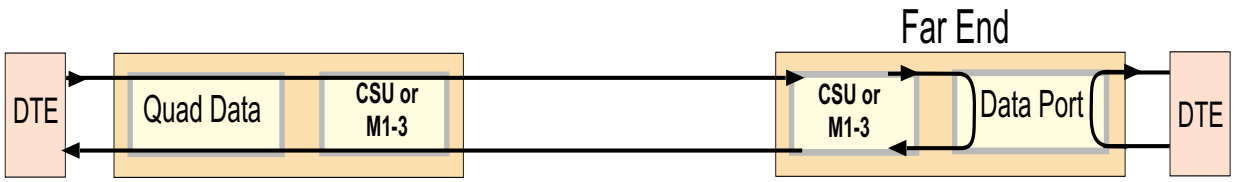
During a DPL, all data transmitted by the far-end DTE travels through the entire circuit to the local QUAD DATA port circuitry. It is then looped back in the network transmit path to the far-end DTE. If the far-end DTE reports no errors, the entire transmission path has tested OK. The SCM will report a **Near End ELB** alarm for a Data Port Loopback.

Far-End Loopback

When a port of the QUAD DATA module is routed to another QUAD DATA module or any type of CSU/DSU that supports industry standard DSU loop codes—far-end loopbacks are supported. When the **Fn)** command is used, the QUAD DATA module transmits a loopback request for a fixed period of time (a few seconds).

While it is sending the loopback code, the module monitors the receive data for that port. Under ideal circumstances, the QUAD DATA module transmits the test pattern for a few seconds, the far-end device enters a loopback state, and then the QUAD DATA module briefly receives its own loopback code. This will not always occur, but if the QUAD DATA module does detect that it is receiving its own loopback request, it "knows" that the far-end loopback was successful and indicates this on the third line of the **Diagnostics Menu**. See Figure 4-3.

Figure 4-3 Far End Loopback



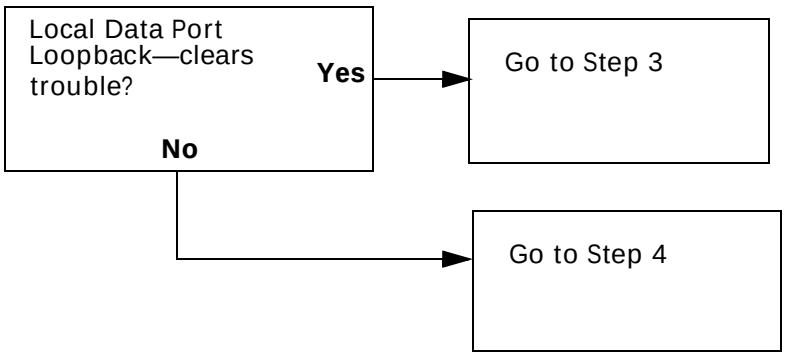
Therefore the presence of "yes" for the Far-end loopback field indicates that the QUAD DATA module has detected a loopback. The presence of "no" on the **Far-end loopback** field only indicates that the QUAD DATA module did not detect a loopback. It does not necessarily mean that no loopback exists. If a loopback has been initiated by a far-end operator or network service provider, it will not be indicated in the **Far-end loopback** field.

DTE as Test Set

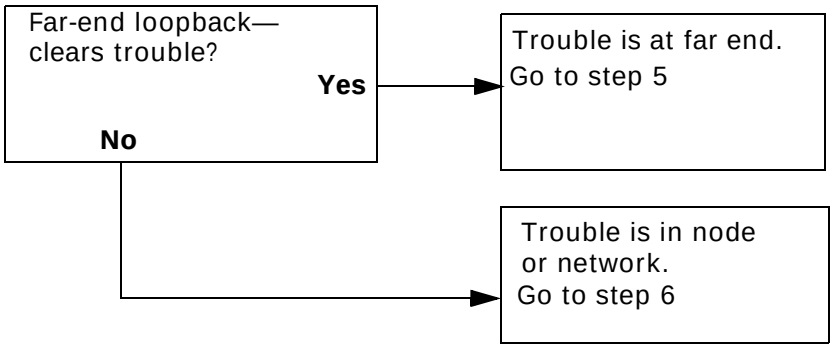
In addition to the tests built in to all Verilink products, many types of Data Terminal Equipment will indicate received errors and detected loopbacks. Often this equipment operates using a protocol which is transparent to the Verilink hardware and may provide additional performance information. By using loopbacks in conjunction with the information provided by the DTE, problems can often be located and corrected. A suggested troubleshooting procedure follows.

1. Connect to the DTE which is reporting errors. Establish a local Data Port Loopback and observe whether the errors clear.

2. Follow the logic in the figure below:



3. If a local DPL resolves the error, the local DTE and cabling are OK. Try to establish a far-end loopback.



4. If a local DPL does not clear a local problem, the defect is local. Verify cabling to the QUAD DATA module. Verify that the correct interface type has been selected. Try changing the clock option (if the port is not set for X.21). Consider the possibility that the local DTE or QUAD DATA module is defective.

5. If a local loopback clears a problem and a far-end loopback also clears the problem, the problem exists in the far-end DTE, the far-end QUAD DATA module or DSU, or the configuration of some device at the far end. Try changing the selection for the clock option (ST vs Inverted ST) in the far end DSU or QUAD DATA module. If the far end DCE is sampling near the edge of each bit presented by the far-end DTE, the local DTE would receive errors. These errors would clear during loopbacks if the local DCE is sampling correctly.

6. If a local loopback clears a problem but a far-end loopback does not clear the problem—the trouble exists in a portion of the local node outside the QUAD DATA module (less likely) or in the network (more likely). If the network facility on which the troubled circuit leaves the local site is used only for this circuit (an entire T1 for one application), do a local loopback on the network port. If this clears the problem it *is* in the

network. If it does not, it is in the node. If the network facility is shared between the troubled circuit and other applications; check those applications to see if they are in trouble.

Other Tests

The QUAD DATA module is always used with other application modules which have network ports. These modules also offer diagnostic functions for testing network circuits. If the procedures in this section do not resolve any issues you may have, see the manual for the module to which the data port is mapped.

Alarms

The **Alarm Menu** is accessed by typing A at the QUAD DATA **Main Menu**.

Alarm Menu

Figure 4-4 illustrates the QUAD DATA **Alarm Menu**.

Figure 4-4 QUAD DATA Alarm Menu

```
-- QUAD DATA ALARM MENU --

                              Port 1     Port 2     Port 3     Port 4

Pn) port alarm reporting       no         no         no         no

A) card alarm reporting       no
D) display alarm buffer
X) exit this menu

A [0.0.0.2] [1,2] QUAD DATA >
```

The options on the QUAD DATA **Alarm Menu** are described in TABLE.

Menu Option	Description
Pn) port alarm reporting	Used to turn alarm reporting on or off for each port. Normally yes for all in service ports.
A) card alarm reporting	Used to turn alarm reporting on or off for the entire module.
D) display alarm buffer	Produces one or more screens of output listing every alarm in the QUAD DATA module memory. This buffer is cleared on a power-reset of the module. See below.
X) exit this menu	Returns to the QUAD DATA **Main Menu**.

Alarm Buffer

Figure shows a typical **Alarm Buffer** display.

Figure 4-5 Alarm Buffer Display

```
* 0.0.0.2          QUAD DATA    [01,02] Cleared alarm         Data Port 1
   Near-End ELB looped Alarm                                  9-08-98  22:39:52

* 0.0.0.2          QUAD DATA    [01,02] Cleared alarm         Timing Bus
   Near-End CSU Loss of Active Clock Alarm                    9-08-98  22:39:25

* 0.0.0.2          QUAD DATA    [01,02] Minor alarm           Timing Bus
   Near-End CSU Loss of Active Clock Alarm                    9-08-98  22:39:23

* 0.0.0.2          QUAD DATA    [01,02] Cleared alarm         Timing Bus
   Near-End CSU Loss of Active Clock Alarm                    9-08-98  22:39:13

* 0.0.0.2          QUAD DATA    [01,02] Minor alarm           Timing Bus
   Near-End CSU Loss of Active Clock Alarm                    9-08-98  22:39:10
```

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